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ABSTRACT

A study examined the relationship between reading and writing and the abstract thinking ability of college freshmen. It was hypothesized that (1) reading ability, writing ability, and thinking ability would be highly correlated; (2) instruction that improves either reading or writing would also improve thinking; and (3) reading, writing, and thinking skills would all be strong predictors of success in freshman composition. Subjects, 250 freshman composition students at an Oklahoma university, completed the "Test of Everyday Writing Skills" (TEWS), the "Nelson-Denny Reading Test" and the "Watson-Glaser Critical Thinking Appraisal." Of these subjects, 120 were then randomly assigned to three treatment groups--one attending the reading laboratory for 20 sessions, one attending the writing laboratory for 20 sessions, and one making up a control group, attending only the composition class. Only nine subjects completed this second part of the experiment. At the end of the 10-week treatment, subjects repeated the three tests. Final course grades were obtained and discriminant analysis was done using the three test scores. Results indicated that reading ability was better than writing ability as a predictor of thinking ability, but both reading and writing were significantly correlated with thinking and with each other. Age was not a factor in thinking. (Tables of findings are included.) (HTH)

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The Relationship of Reading and Writing to Thinking Among University Students Taking English Composition

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The Relationship of Reading and Writing to Thinking Among University Students Taking English Composition

This study sought to determine the relationship that reading and writing have to the abstract thinking ability of college freshmen. It also hoped to ascertain whether their thinking ability would be affected by instruction designed to increase skill in reading or writing, and it further intended to compare the three variables as predictors of success or failure in English Composition I at Cameron University.

Hypotheses were that (a) reading ability, writing ability, and thinking ability are highly correlated, (b) instruction which improves either reading or writing will also improve thinking, (c) reading, writing, and thinking skills are all strong predictors of success in freshman composition.

Reading and writing are two closely related modes of language: reading is the receptive mode and writing is the productive mode (Athey, 1983). Although certain exceptions have been noted, as in the case of the young man who has a reading disability but writes well (Rack, 1981), it is unusual for a poor reader to be a good writer. Writing and reading are correlates, however, and it is through writing that a student learns structural characteristics and meanings which lead to efficiency in reading (Waller, 1976).

As a student develops facility in reading and writing he becomes able to manipulate the language into more complex forms (Weiner, 1980). As this occurs his thought processes are changed,

and he moves into abstract thinking which further improves his reading and writing. Jerome Bruner (1975) stated that a student achieved analytical competency as he became more adept at manipulating language and that the capacity to learn was affected.

Other studies have produced conflicting results on the connections among reading, writing, and abstract thinking. One study which used Rorschach tests showed poor readers to be unable to comprehend well structured whole responses which require both abstract thought and synthesis (Alheidt, 1980). A study done with third graders and fifth graders found that abstract reasoning ability significantly affected reading performance (Harber, 1978). Another study found no connection at all between reading ability and abstract reasoning (Decker and De Fries, 1980).

National attention was focused on the importance of higher order thinking by the National Commission of Excellence in Education in its report entitled A Nation at Risk (1983). That Commission found that many 17-year-olds did not possess "higher order" intellectual skills; 40% could not draw inferences from written materials and 80% could not write a persuasive essay. In spite of the widely held belief that higher order thinking is a crucial indicator of the educated person, Giroux (1984) suggested that public philosophy does not demand that students be critical thinkers.

Perry (1970) found that thinking skills develop during the college years. He was followed by researchers (Brabeck, 1980; Wood, 1980) whose studies seemed to indicate that critical thinking

ability as measured by the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1964) is essential to the development of more complex cognitive ability.

Schmidt and Davison (1983) went so far as to suggest that enhancement of critical thinking skills would result in increased cognitive development, and another study (Litivin & Haas, 1983) showed that scores on the Watson-Glaser Critical Thinking Appraisal could be raised. Worsham & Austin (1983) demonstrated that a structured cognitive skills program in a school system can improve Scholastic Aptitude Test (SAT) scores in vocabulary and reading comprehension.

It is known that linear thinking is used in reading comprehension, but that nonlinear thinking is important for good writing (Friend, 1983). Good writing requires planning, and planning is a thinking process. Other essential components of writing are organization of the material, translation of meaning from ideas to graphics, and rethinking of what has been written in order to improve it (Humes, 1983). All involve thinking.

METHODOLOGY

Cameron University with an enrollment of 5,030 students is part of the state supported system of higher education in the State of Oklahoma. The University is predominantly a commuter college which serves a several-county area in Southwestern Oklahoma. It provides a writing laboratory and a reading laboratory free of charge, but

attendance at these labs is strictly voluntary.

When the experiment took place in the spring of 1984, the policy of the university was to admit all applicants no matter how low their scores were on the ACT test. Since spring semester Composition I classes include repeaters who have failed the course in the fall semester and are trying again, spring seemed to provide an ideal pool of poor students to choose as subjects who would benefit from attendance at a reading lab or a writing lab.

All students enrolled in Composition I at Cameron University during the spring semester of 1984 were subjects for the experiment with the exception of a team-taught experimental class which did not participate. A total of 250 students, 127 males and 123 females, ranging in age from 17 to 41 with an average age of 22.8, were given three tests during their regular Composition I class time. These tests were The Test of Everyday Writing Skills (TEWS), The Nelson Denny Reading Test and The Watson-Glaser Critical Thinking Appraisal. The TEWS is a standardized test from McGraw Hill which was found to discriminate well (Hoffman, Smith, 1980). The widely used Nelson Denny Reading Test determines the student's reading grade level. The Watson-Glaser Critical Thinking Appraisal consists of five subtests: (1) inference, (2) recognition of assumptions, (3) deduction, (4) interpretation, and (5) evaluation of arguments (Harcourt Brace, Javonovich, Inc., 1980).

Stage 1

A multiple regression was performed on raw scores from these

tests for each student. The score on The Watson-Glaser Critical Thinking Appraisal was used as the dependent variable while reading tests scores, writing test scores, and age were used as independent variables.

Stage 2

Sixty men and sixty women were selected from volunteers who agreed to participate in the research. They were randomly assigned to three treatment groups. One group would attend the reading laboratory for 20 sessions, another would attend the writing laboratory for 20 sessions, and the third group would be a control group who had only the composition class for instruction. At the end of a 10-week period, all subjects would take forms of the three tests again and would receive $10.00 for their participation in the experiment. The first score and the second score of each test would be tested by a 2 x 2 Analysis of Variance to see if significant improvement had occurred on any test. Then, pretest scores would be subtracted from post-test scores to obtain an improvement score for each test. Improvement scores would be tested by a 2 x 3 Analysis of Variance to see which treatment group was most effective. In both ANOVA designs, males and females would be separated to see if differences existed between the sexes.

Stage 3

At the end of the course, final grades were obtained from Composition I professors and discriminant analysis was done using the Nelson Denny Reading score, the TEWS score, and the percentile level

of the student's score on the Watson-Glaser Test of Critical Thinking. Scores which were C or above were classified as "Pass" and D, F, or Withdrawal grades were classified as "Fail". A second discriminant analysis was done with four groups. In this test the levels were AB, C, DF, and Withdrawal. It was predicted that Withdrawal grades mainly represented students who were failing the course.

RESULTS

Stage 1

A multiple regression using thinking as measured by the Watson-Glaser Critical Thinking Appraisal as the dependent variable showed that reading correlated .67 with thinking, writing correlated .385 with thinking, and age correlated .209 with thinking.

CORRELATION				
	THINK	READ	WRITE	AGE
THINK	1.000	.674	.385	.123
READ	.674	1.000	.542	.209
WRITE	.385	.542	1.000	-.044
AGE	.123	.209	-.044	1.000

Table 1

An examination of the Betas showed that the correlation between reading and thinking was significant, but the correlation between thinking and writing was not. The age correlation could also have occurred by chance.

MULTIPLE REGRESSION COEFFICIENTS & BETA WEIGHTS					
VARIABLES	REGRESSION COEFFICIENT	ERROR	BETA	T	SIG. OF T
READ	.27474	.03038	.66416	9.043	.0001
WRITE	.01927	.05783	.02385	.33	.7395
AGE	-.02248	.09610	-.01445	-.234	.8153

Table 2

Since reading and writing were correlated .54, collinearity was suspected. A second multiple regression program separating the two variables showed that both reading and writing significantly correlated with thinking among this group of students.

CORRELATION SEPARATING READING FROM WRITING				
	THINK	READ	WRITE	AGE
THINK	1.000	.668	.345	.148
READ	.668	1.000	.504	.232
WRITE	.345	.504	1.000	.015
AGE	.148	.232	.015	1.000

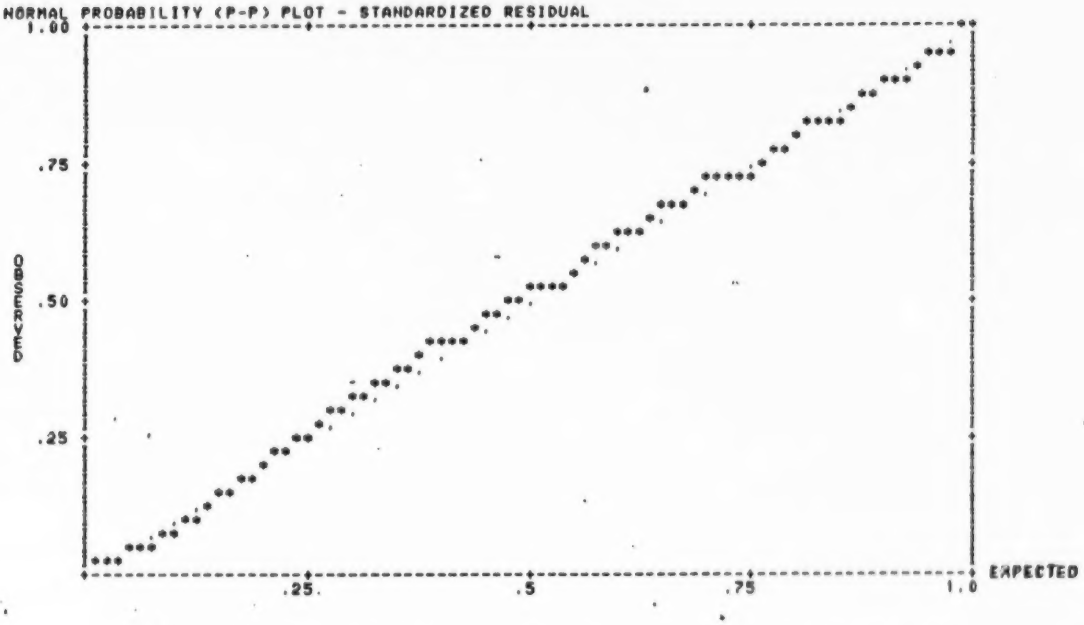
MULTIPLE REGRESSION COEFFICIENTS & BETA WEIGHTS					
VARIABLES	REGRESSION COEFFICIENT	ERROR	BETA	T	SIG. OF T
READ	.28582	.02365	.66834	12.088	.0001
WRITE	.27726	.05597	.34261	4.954	.0001
AGE	-.01227	.09529	-.00734	-.129	.8977

Table 3

The Durbin-Watson Test for reading was 1.89, a histogram showed an almost normal curve, and the residuals lined up well along the slope for $\hat{Y}$.

Figure 1

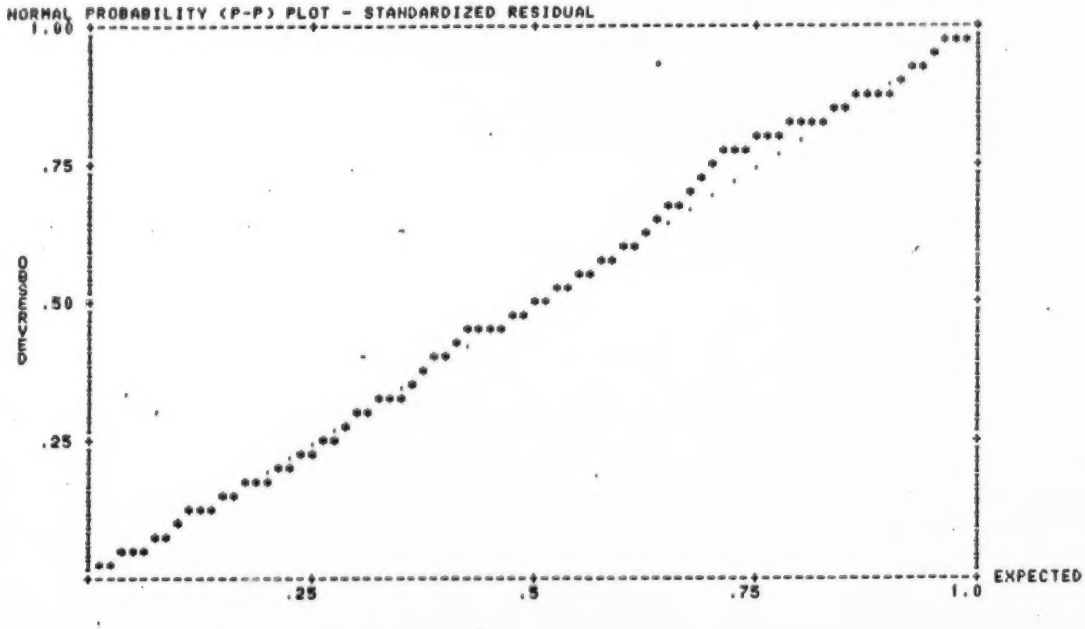
Probability Plot for Residuals from Reading Regression



When writing and age were in the equation, the Durbin-Watson test equalled 1.97. A histogram again showed an almost normal curve, and the residuals lined up fairly well along the slope for $\hat{Y}$.

Figure 2

Probability Plot for Residuals from Writing and Age Regression



In both tests, the independent variables were reading, writing, and age. In the second test, reading correlated .67 with thinking and this was significant ($F = 146.12$, $p < .001$). Writing correlated .35 with thinking and this was also significant ($F = 14.55$, $p < .001$). Age was not significantly correlated with thinking.

Stage 2

In stage two only nine students finished the experiment. Even though scores indicated that they needed help, most students were too busy with jobs and/or family obligations to visit the labs regularly. Some students visited the labs a few times, but could not commit themselves to the time required for the experiment. Many withdrew from Composition I.

Of the nine who finished the experiment, five were in the writing lab group and four were in the reading lab group. Eight of these, four from each lab, were selected to be subjects and a 2 x 2 analysis of variance was done on each test (reading, writing, and thinking) to see if significant improvement had occurred as a result of either lab or on any test. The ANOVA's showed no significant improvement on any test as a result of attending either lab for twenty visits.

SCORE IMPROVEMENT BY TEST AND BY LAB					
TEST & LAB	SUM OF SQUARES		MEAN SQUARE	F	SIG. OF F
WRITING					
MAIN EFFECTS	211.625	2	105.813	2.034	.17
TESTS (PRE/POST)	189.063	1	189.063	3.634	.08
LAB	22.5	1	22.56	.43	.52
READING					
MAIN EFFECTS	289	2	144.5	.20	.82
TESTS (PRE/POST)	225	1	225	.32	.59
LAB	64	1	64	.09	.77
THINKING					
MAIN EFFECTS	190.63	2	95.3	.363	.70
TESTS (PRE/POST)	52.56	1	52.6	.200	.66
LAB	138.06	1	138.06	.526	.48

Table 4

Stage 3

The discriminant analysis which tested the three variables as predictors of success in Composition I, showed that they were all good predictors. Thinking was best, writing was next, and reading was last.

There were more cases of failure (89) than of success (81) in Composition I. The Canonical correlation of .389053 showed that 15% of student success or failure could be explained by the percentile group occupied as a result of taking The Watson-Glaser Critical Thinking Appraisal. The Canonical correlation for all three of the variables was .4770957, and the Discriminant Prediction Equation was

$$Z = .55083X_1 + .55245X_2 + .20881X_3$$

At the first step, X_1, F = 30.101, $p < .0001$; at the second step, X_2, F + 23.95, $p < .0001$; and at the third step, X_3, F = 16.31, $p < .0001$.

VARIABLE IN THE ANALYSIS AFTER STEP 3			
VARIABLE	TOLERANCE	F TO REMOVE	WILKS LAMBADA
THINK (X_1)	.7106552	8.5678	.8122448
READ (X_2)	.6161124	1.0213	.7771317
WRITE (X_3)	.8281436	10.134	.8195304

Table 5

When pass/fail was changed to four groups (AB, C, DF, and W) where AB stands for a grade of A or B, C stands for a grade of C, DF stands for a grade of D or F, and W stands for a withdrawal from the course, it was shown that 61% of the withdrawal grades were predicted failures. The procedure which called them failures in the first Discriminant Analysis seems to be justified.

Of the 250 students tested in English Composition, 44% had Watson-Glaser scores in the 35th percentile or below and 36% of the low scorers dropped the course. Only 5% of the students made scores in the 90th percentile or above and there were no withdrawals and no F's in that group. Grade distributions are shown in Figures 3 and 4.

Figure 3

Final Grades of Students in 35th Percentile or Lower on Watson-Glaser Test

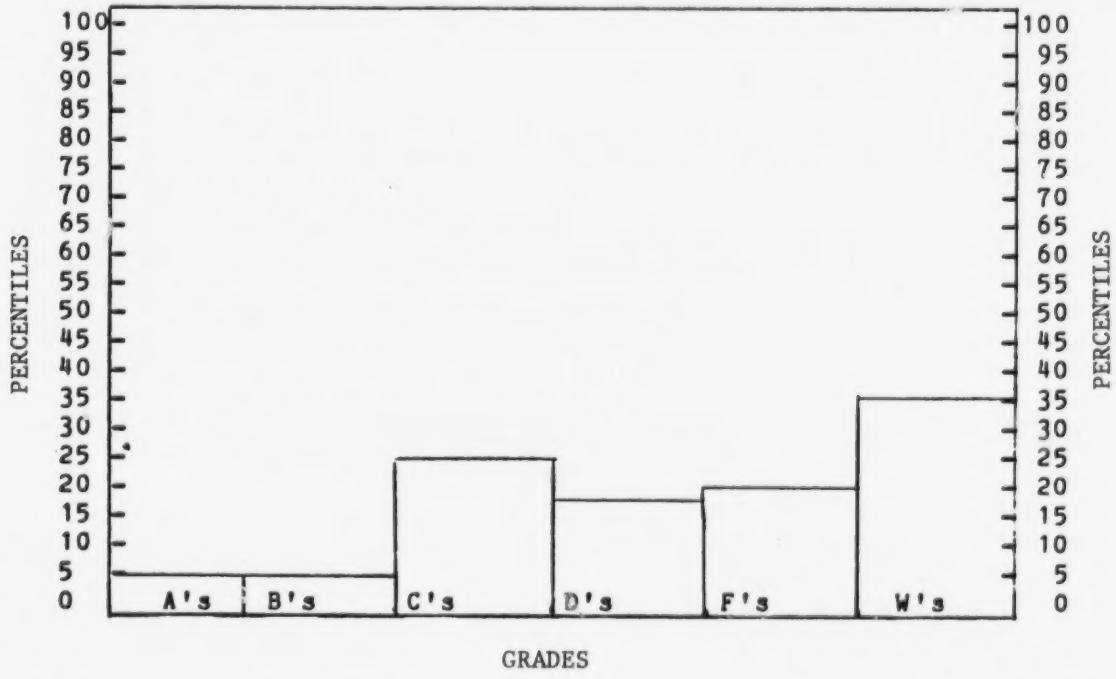
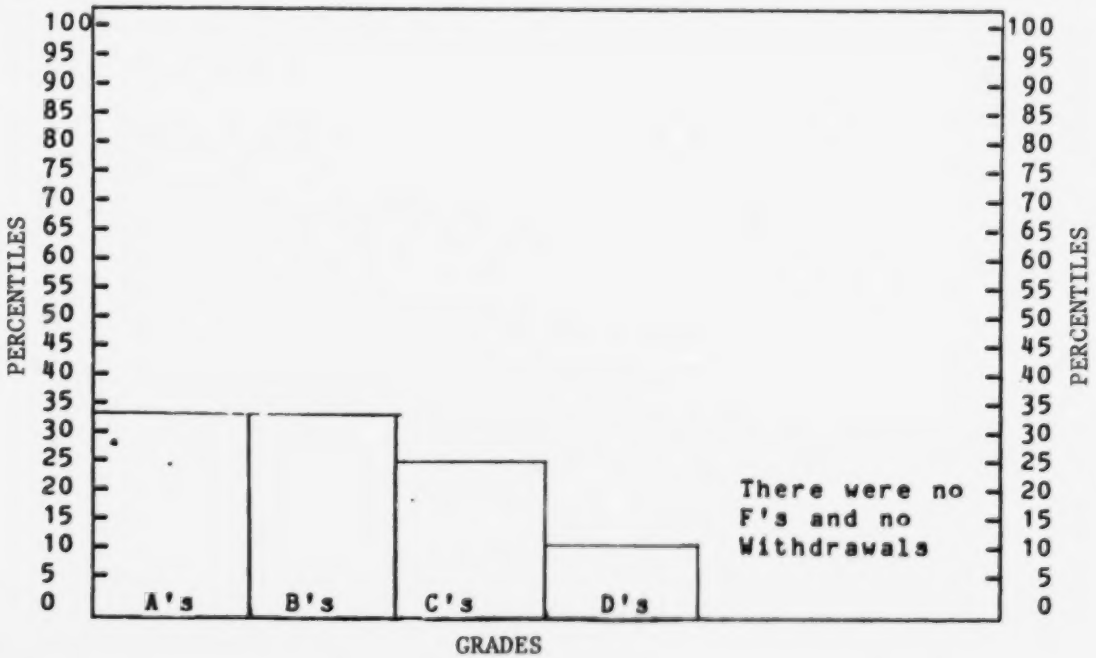


Figure 4

Final Grades of Students in 90th Percentile or Above on Watson-Glaser Test



Conclusions

For the students who took Composition I at Cameron University during the spring semester of 1984, reading ability is better than writing ability as a predictor of thinking ability, but both reading and writing are significantly correlated with thinking and with each other. Age is not a factor in thinking.

Nothing can be said about the ability of remedial laboratories to improve student scores in reading, writing, or thinking. The study shows that these particular students did not invest enough time in remedial instruction to help themselves correct deficiencies in reading or writing. It would seem that these deficiencies should be addressed and conquered at a lower than college level. The assumption that the spring semester would be best for the experiment because it provided a larger pool of poor students was not a good one. The poor students were there, but they did not respond well to the attempt to measure their efforts to help themselves.

All three of the variables reading, writing, and thinking are good predictors of success in English Composition I for this particular group of students at Cameron University. Thinking ability is the best one of the three and writing ability is second. The TEWS test is not a good predictor of critical thinking ability, but it is a good predictor of success in Composition I. Thinking ability seems to be required for a student to be able to write well, but good writing ability is not a prerequisite for thinking skills. Other studies need to be done to see if these findings can be

generalized to college freshmen in Composition I at other schools across the country. If the results do have general application, then studies should be done to investigate ways of improving thinking ability so that students write better. It may be that rhetoric and logic should be taught at the elementary school level to develop the thinking process in children.

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